Java Programming Assignment

Section 1: Java Data Types

1. What are the different primitive data types available in Java?

Java has a 8 primitive data types it is a building blocks of the data they are

1.Int 2.Short 3.long 4.float 5.double 6.char 7.byte 8 boolean

1. Int store integer values and also it is 8 bit signed
2. Short is a 16 bit signed
3. Long stored long values it is a 64 bit signed(ex: ph no:10000000000)
4. Float stored decimal values and it is 32 bit signed
5. Double is used for for decimal numbers with higher numbers
6. Char is stored characters and it is 16 bit signed
7. Byte it is 8 bit signed and byte range is -128 to 127
8. Boolean is used for conditions (true/false)

2. Explain the difference between primitive and non-primitive data types in Java.

Primitive data types

Basic data types (like building blocks)

Store simple values like numbers, true or false, characters

Ex: int, double, boolean, char

Non-primitive data types

Non primitive data type are passed by references

Ex:String,array,class,object

3. Write a Java program that demonstrates the use of all primitive data types.

```
public class Primitive_Data_Types {
    public static void main(String[] args) {
```

```
        // byte
        byte Byte = 100;
        System.out.println("Byte: " + Byte);
        // short
        short Short = 20;
        System.out.println("Short: " + Short);
        // int
        int Int = 1000;
        System.out.println("Int: " + Int);
        // long
        long Long = 1000000000;
        System.out.println("Long: " + Long);
        // float
        float Float = 3.14f;
        System.out.println("Float: " + Float);
        // double
        double Double = 3.14159;
        System.out.println("Double: " + Double);
        // boolean
        boolean Boolean = true;
        System.out.println("Boolean: " + Boolean);
        // char
        char Char = 'A';
        System.out.println("Char: " + Char);
    }
}
```

Output:

Byte: 100

Short: 20

Int: 1000

Long: 1000000000

Float: 3.14

Double: 3.14159

Boolean: true

Char: A

4. What is type casting? Provide an example of implicit and explicit casting in Java.

Type casting is the process of converting one data type into another

There are two types of casting

1. Implicit Casting (Widening):

```
public class Type_casting {
        public static void main(String[] args) {
int num = 100;
System.out.println("value of num="+num);
Float d=num;
System.out.println("value od d="+d);
}
}
```

Output: 20

20.0

2. Explicit Casting (Narrowing):

```
public class Type_casting {
  public static void main(String[] args) {
double d = 10.5;
System.out.println("value of num="+d);
Int num=(int)d;
System.out.println("value od d="+num);
}
}
```

Output: 10.5

10

5. What is the default value of each primitive data type in Java?

Section 2: Java Control Statements

1. What are control statements in Java? List the types with examples.

control statements help with the control flow of the program.

1. Decision-making statements

These help the program choose between different options.

There are 4 types

1 if

2 if-else

3 if-else-if

4 switch

2. Looping statements

These help to repeat a block of code multiple times.

There are 3 types

For 2. while 3. do-while

for loop

```
package while_loop;

public class for_loop {

public static void main(String[] args) {

for(int i=2;i<=15;i++)

{

System.out.println(i);

}


}

}
```

Output:

```
2
3
4
5
6
7
8
9
10
11
12
13
14
15
```

while loop

Ex:

```
package while_loop;

public class While_loop {

public static void main(String[] args) {

char letter='a';
```

while(letter<='d')

{

```
System.out.println(letter);
letter++;
}
}

}
```

Output:

```
a
b
c
d
```

do-while

package while_loop;

public class Do_while {

public static void main(String[] args) {

int i=1;

do {

System.out.println("Hello");

i++;

}

while(i>=10);

}

}

Output:

```
Hello
```

3. Jump statements

These are used to jump out of loops or skip parts of code

There are 3 types

1. Break

```
public class BreakExample {
        public static void main(String[] args) {
                for (int i = 1; i <= 10; i++) {
                        if (i == 5)
                                break;
                        System.out.println(i);
    }
}
```

Output:

1

2

3

4

2. Continue

```
package Control_statements;
public class Even_number {
public static void main(String[] args) {
for(int i=1; i<=10; i++)
{
if(i==2 || i==4)
continue;
System.out.println(i);
}
```

```
}

}
```
Output:

```
1
3
5
6
7
8
9
10
```

3. Return

```
public class ReturnValue {

        public static void main(String[] args) {

             int result = addNumbers(10, 20);

    System.out.println("Sum = " + result);

        }

        public static int addNumbers(int a, int b) {

               int sum = a + b;

               return sum;

        }

}
```

Output:

Sum = 30

2. Write a Java program to demonstrate the use of if-else and switch-case statements.

3. What is the difference between break and continue statements?

Break

The break statement is used to exit a loop prematurely

continue

The continue statement is used to skip the rest of the code inside a loop for the current iteration only.

4. Write a Java program to print even numbers between 1 to 50 using a for loop.

```
package Assesement;

public class Even_number {

public static void main(String[] args) {

for(int num=2; num<=50; num=num+2)

{

System.out.println(num);

}

}

}
```

Output:

```
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
```

5. Explain the differences between while and do-while loops with examples.

Section 3: Java Keywords and Operators

1. What are keywords in Java? List 10 commonly used keywords.

1. if (for conditions)

2. else (for alternative conditions)

3. for (for loops)

4. while (for loops)

5. class (for defining classes)

6. public (for access modifiers)

7. private (for access modifiers)

8. return (for returning values)

9. new (for creating objects)

10. void (for methods without return values)

2. Explain the purpose of the following keywords: static, final, this, super.

static: Shared by all instances of a class

final: Cannot be changed. Final variables have fixed values, final methods can't be overridden

this: Refers to the current object and used to access class members (methods, variables)

super: Refers to the parent class and used to access parent class members (methods, variables)

2. What are the types of operators in Java?

1. Arithmetic (+, -, *, /)

2. Assignment (=, +=, -=)

3. Comparison (==, !=, >, <)

4. Logical (AND, OR, NOT)

5. Bitwise (bit-level operations)

6. Unary (++, --)

4. Write a Java program demonstrating the use of arithmetic, relational, and logical operators.

```
package Assesement;

public class Operators {

	public static void main(String[] args) {

		int x = 10;

		int y = 5;


		// Arithmetic Operators

		System.out.println("x + y = " + (x + y));

		System.out.println("x - y = " + (x - y));


		// Relational Operators

		System.out.println("x > y: " + (x > y));

		System.out.println("x == y: " + (x == y));


		// Logical Operators

		System.out.println("x > y && x == 10: " + (x > y && x == 10));

		System.out.println("x > y || x == 5: " + (x > y || x == 5));

	}

}
```

Output:

x + y = 15

x - y = 5

x > y: true

x == y: false

x > y && x == 10: true

x > y || x == 5: true

4. What is operator precedence? How does it affect the outcome of expressions?

operators follow a specific order in an expression.

Operator precedence affects the outcome by determining which operations are performed first ensuring expressions are evaluated correctly.

Additional Questions

Java Data Types

5. What is the size and range of each primitive data type in Java?

	Byte	range
1.	byte: 1 ,	-128 to 127
2.	short: 2	-32,768 to 32,767
3.	int: 4	-2,147,483,648 to 2,147,483,647
4.	long: 8	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
5.	float: 4	±3.4e+38
6.	double: 8	±1.8e+308
7.	boolean: 1	bit (true or false)
8.	char: 2	(0 to 65,535)

6. How does Java handle overflow and underflow with numeric types?

Overflow: When a value higher then maximum limit of a data type it wraps around to the minimum value.

Underflow: When a value is less than the minimum limit of a data type it wraps around to the maximum value.

7. What is the difference between char and String in Java?

char is a single letter or symbol and it represented single quotation ‘ ‘

String is a collection of characters like a word or sentence. And it is represents double quotations “ “

8. Explain wrapper classes and their use in Java.

Wrapper classes wrap primitive data types into objects, providing additional functionality.

Int-Integer

Short-Short

byte-Byte

long-Long

float-Float

double-Double

boolean-Boolean

Java Control Statements

6. Write a Java program using nested if statements.

```
package while_loop;

public class nested_if {

public static void main(String[] args) {

for(int i=0;i<=5;i++)

{

for(int j=0;j<=i;j++)

{
```

```
System.out.print("* ");
}
System.out.println();
}


}
}
```

Output:

```
*
* *
* * *
* * * *
* * * * *
* * * * * *
```

7. Write a Java program to display the multiplication table of a number using a loop.

```
package Assesement;
public class Multiplication_table {
public static void main(String[] args) {
for(int i=1; i<=20; i++)
{
System.out.println(7*i);
}
}
}
```

```
Output:
7
14
21
28
35
```

```
42
49
56
63
70
77
84
91
98
105
112
119
126
133
140
```

7. How do you exit from nested loops in Java?

If nested loops are inside the method then we have to use return value it will exit the loop

```
package Assesement;

public class ReturnValue {

	public static void main(String[] args) {

		int result = addNumbers(10, 20);

   System.out.println("Sum = " + result);

	}

	public static int addNumbers(int a, int b) {

		int sum = a + b;

		return sum;

	}

}
```

Output:

Sum = 30

8. Compare and contrast for, while, and do-while loops.

For Loop

Repeat code for a set number of times.

While Loop

Repeat code while a condition is true

Do-While Loop

Repeat code while a condition is true

9. Write a program that uses a switch-case to simulate a basic calculator.

```
package Assesement;

public class Calculator {

	public static void main(String[] args) {

		int choice = 1;

		double num1 = 10;

		double num2 = 5;

		switch (choice) {

			Case1:    System.out.println("Result= " + (num1 + num2));

				break;

			case 2: System.out.println("Result= " + (num1 - num2));

				break;

			case 3: System.out.println("Result= " + (num1 * num2));

				break;

			case 4: System.out.println("Result= " + (num1 / num2));

				break;

			Default: System.out.println("Invalid choice!");

		}

	}

}
```

Output:

Result= 15.0

Java Keywords and Operators

6. What is the use of the `instance` keyword in Java?

The instance of keyword in Java is used to check if an object is an instance of a specific class or an interface.

7. Explain the difference between `==` and `.equals()` in Java.

== checks if it is the same object

equals() checks if the objects are equal in value

8. **Write a program using the ternary operator.**

```
package Assesement;

public class Ternary Operator {

    public static void main(String[] args) {

        int x = 10;

        int y = 5;

        int max = (x > y) ? x : y;

        System.out.println("Maximum value= " + max);

    }

}
```

Output:

Maximum value= 10

9. What is the use of `this` and `super` in method overriding?

Super key is used to call the variables and methods and constructor

This keyword is used refer the current class

10. Explain bit-wise operators with examples.

Types:

1. & (AND)

Example: 5 & 3 = 1

2. | (OR)

Example: 5 | 3 = 7

3. ^ (XOR)

Example: 5 ^ 3 = 6

4. ~ (NOT)

Example: ~5 = -6

5. << (Left Shift)

Example: 5 << 1 = 10

6. >> (Right Shift)

Example: 10 >> 1 = 5